Department of Agriculture and Land Stewardship - Nutrient Reduction Pilot Project

House File 2454; Sec. 36. REVERSE AUCTION. The department of agriculture and land Stewardship shall establish a pilot project to determine the feasibility and cost-effectiveness of conducting reverse auctions when allocating financial assistance to persons seeking to establish practices that reduce the transport of nutrients to surface water from nonpoint sources within watersheds. The department shall advertise for bids, analyze accepted bids, and award cost-share moneys to one or more successful bidders based on a ranking that computes the greatest benefit-to-cost ratio for all accepted bids. The department shall prepare and submit a report regarding its findings and recommendations to the governor and general assembly not later than January 13, 2017

Approach

Partnership Discussion

The Iowa Department of Agriculture and Land Stewardship (IDALS) solicited input from ISU Extension, State Soil Conservation Committee (SSCC), Natural Resources Conservation Service (NRCS), and the Iowa Department of Natural Resources (DNR) to determine various methodologies and options to implement a reverse auction pilot program.

Budget

No funds were allocated to the Departments budget to complete the reverse auction pilot program. The SSCC volunteered funds from their Research and Demonstration fund in an effort to implement the reverse auction pilot project.

Timeline

- Advertisements through the local SWCDs were completed in August, 2016
- Deadline to receive applications from landowners was September 9, 2016.
- Bid awards were notified by December 15, 2016.
- Practice implementation will occur in the spring and fall of 2017 for successful bids

Project Scope and Area of Influence:

The project was implemented county wide within two Soil and Water Conservation Districts (SWCDs). Humboldt County in northcentral Iowa was selected based on its primarily flat landscape and interest in targeting management practices such as cover crops and edge of field practices like bioreactors.

Keokuk County in southeast Iowa was selected due to its rolling landscape, historic demand for and use of state cost share funds for conservation practices and the staff's ability to design the conservation practices in a timely manner.

Conservation Practices Available to Landowners through the Reverse Auction:

- Structural practices: Terraces, waterways, grade stabilization structures, water & sediment control basins
- Management Practices: Cover crops, no-till, strip-till (only 1st time users are eligible)
- Edge of Field Practices: Bioreactors

Information and Outreach

Outreach efforts in Humboldt County were completed by the local SWCDs. These efforts included an article in the Humboldt Independent Newspaper that ran for two weeks, an advertisement in the local Reminder newspaper that ran for two weeks, 25 colored flyers posted in local coops, banks, grocery stores and other businesses, and word of mouth through the local SWCD Commissioners and staff at the field office.

Outreach efforts in Keokuk County were completed by the local SWCDs. These efforts included an article in the following local papers; The Sigourney News Review, the Eagle out of Keota, the Plainsman-Clarion out of Richland, the EV Star out of North English and the Farm Bureau Spokesman on the Keokuk county page. Additional outreach was completed by the SWCD commissioners and field office staff through word of mouth.

Technical Assistance

State and federal field office personnel provided technical assistance to producers interested in the reverse auction pilot project. All conservation practices completed through this project were designed to meet NRCS standards and specifications. Technical assistance included working through the NRCS 9-Step planning process required for all landowners that submitted bids for the project. It should be noted that design estimates for the bioreactor were completed through the Iowa Soybean Association due to the limited capacity of staff to design these types of structures.

Calculating Nitrogen and Phosphorus Load Reductions

The Pollutant Load Reduction Calculator was used to calculate reductions in sediment and phosphorus delivery. The calculator has been widely used by IDNR and IDALS for reporting sediment and phosphorus load reductions for water quality improvement projects administered throughout the state. The calculator requires data specific information including but not limited to soil loss calculations using the Revised Universal Soil Loss Equation (RUSLE II), drainage area, tillage, slopes, watershed characteristics, landform regions and other factors that influence sediment delivery. Phosphorus load reductions for each practice were based on the following EPA approved formula: 1 ton of sediment = 1.3 pounds of phosphorus (Each ton of sediment delivery reduced as a result of the practice being installed also reduces an estimated 1.3 pounds of associated phosphorus loading).

Nitrogen loading estimates from the proposed bioreactor site are based on calculations completed by the Iowa Soybean Association based on water monitoring data collected at the site. Cumulative nitrogen load reduction calculations for the bioreactor were estimated at 42% based on Iowa's Nutrient Reduction Strategy Report.

Calculating Benefit-to-Cost Ratio for the Practices

The following formula was used to calculate the cost benefit ratio: Cost share rate/pounds of phosphorus or pounds of nitrogen loading reduced. For this formula, the cost share rate is the equivalent to the state's contribution toward the project.

Attachment A identifies the conservation practices, N and P load reductions, and associated cost benefit ratio for each bid submitted.

Results

Phosphorus

11 landowners submitted bids for terrace projects ranging from 50% cost share to 75% cost share. All projects were evaluated based on total costs, bids, and phosphorus load reductions. Three projects were approved for funding through the pilot program. The total phosphorus load reduction for the three projects was 75 pounds annually. All terrace projects that utlilize state funds are required to have a 20-year maintenance agreement. Based on a 20-year maintenance agreement for the three terrace projects, the total state and landowner cost/pound/year of phosphorus reduced over this time frame is $24.97/pound. Based on the landowners bid, the State's share of those costs are $14.09/pound.

1 Landowner submitted a bid for a bioreactor requesting 79% cost share. The total estimated project cost was $24,000. A $1,000 grant from the Iowa Pork Producers was also used to support this project bringing the state's portion of this project down to 75%. Nitrogen load calculations for this site were based upon water samples collected over a single at the tile outlet. Flow and nitrate concentrations were determined on 9 ocassions on a bi-weekly sampling schedule. Based on the data, an estimated 9.72 pounds of nitrate flow through the tile daily, totaling 1,185.84 pounds annually (assuming 122 days of tile flow/year). Assuming a 42% load reduction for the bioreactor, the total nitrogen load reduction is 498 pounds per year. All bioreactor projects that utilize state funds are required to have a 10-year maintenance agreement, however the anticipated life expectancy for a bioreactor is 10-15 years. Based on a 10 and 15 year life expectancy for the bioreactor the total state and landowner cost/pound/year of nitrogen reduced is $4.82 and $3.21 respectively . Based on the landowners bid, the State's share of those costs are $3.61 (10 years) and $2.40 (15 years).

Discussion

The state of Iowa Code rules allow SWCDs to provide up to 50% cost share for structural conservation practices through the Iowa Financial Incentives Program. Many high workload SWCDs across the state typically implement more restrictive cost share limits in an effort to get more conservation practices on the ground. The Keokuk SWCD has a self-imposed limit of $7,500 per landowner per practice. For example, if a landowner has a project that exceeds $15,000 in total cost, they could only receive a maximum of $7,500 of cost share. Of the 11 bids submitted for the pilot program, 4 exceeded $15,000 in total cost; however no bids received were less than 50% of the total project cost and 8 of the 11 bids requested 70-75% cost share. For this pilot, two projects were approved for funding at 50% and one practice at 75% cost share. The cost to the state to reduce a pound of phosphorus using terraces was $14.09/pound. Had we utilized the existing Iowa Financial Incentives Program to build these same terraces in keokuk county using their self-imposed limits, the cost to the state would have been $10.42/pound

Bioreactors are a relatively new practice to landowners and SWCDs. This edge of field practice can be effective at reducing nitrogen losses, however they can be difficult to site from an engineering perspective and the cost for practice installation is high. Landowners receive no "return on their investment" for most edge of field practices as compared to some of the structural and management practices such as terraces and cover crops that protect soil from erosion and build soil health. Estimated costs for a typical bioreactor range from $10,000 - $12,000. The pilot site in this project was double that cost ($24,000) due to the depth of the existing tile in the field. Although the cost was much higher than we would expect, the site provided high nitrogen loading reductions. At this time, edge of field practices such as bioreactors are not available through state programs on a statewide basis; however the department is moving that direction with Water Quality Initiative (WQI) funding. Current WQI program rules limit state cost share to 50%. The state's cost for the bioreactor site in this pilot was $18,000, which was 75% of the total project cost.

Based on the results of the pilot project using the reverse auction concept, the pilot project has determined that the state's cost actually increased for this pilot as compared to the existing cost share programs available to landowners. There are many potential reasons for this but the overarching thought is that landowners may have used the reverse auction as an opportunity to ask for higher cost share than what is currently available through existing programs, even though they were aware that the lowest bids would likely be the most competitive.

Attachment A

Terrace Projects

Landowner ID	Practice Cost Estimate	Landowner Bid (% Cost share)	State Contribution	Pounds of Phosphorus Reduced Annually	Cost/Pound/Year of Phosphorus Reduced (20 year life expectancy)
***A**	**$7,785.00**	**50%**	**$3,893.00**	**15**	**$12.98**
***B**	**$8,480.00**	**75%**	**$6,360.00**	**22**	**$14.45**
***C**	**$22,576.00**	**50%**	**$11,288.00**	**38**	**$14.85**
D	$12,603.00	75%	$9,453.00	27	$17.51
E	$8,937.00	75%	$6,703.00	17	$19.71
F	$11,337.00	75%	$8,503.00	20	$21.26
G	$21,569.00	75%	$16,177.00	36	$22.47
H	$8,540.00	70%	$5,978.00	13	$22.99
I	$20,421.00	75%	$15,315.75	30	$25.53
J	$23,314.00	75%	$17,486.00	29	$30.15
K	$9,661.00	50%	$4,830.00	2	$120.75

Bioreactor Project

Landowner ID	Practice Cost Estimate	Landowner Bid	Iowa pork Producers Contribution	State Contribution	Pounds of Nitrogen Reduced Annually	Cost/Pound/Year of N Reduced (10 year life expectancy)	Cost/Pound/year of N Reduced (15 year life expectancy)
***A**	**$24,000.00**	**$5,000.00**	**$1,000.00**	**$18,000.00**	**498**	**$3.61**	**$2.40**

* Project approved for funding

Cost effectiveness calculations were made by making a conservative estimate based upon a single season of tile nitrate concentration and flow data. Flows and nitrate concentrations were determined on 9 occasions on a bi-weekly sampling schedule.

- Average of 9.72 lbs of nitrate-N per day
- Estimated 1,185.84 lbs of nitrate-N per year, assuming tile flow of 122 days (April 1 – July 31)
- Potentially 498 lbs/yr of nitrate-N per year removed, assuming 42% load reduction based on the Iowa Nutrient Reduction Strategy

The peak flow observed from the tile during the bi-weekly grab samples was 0.1 cfs, which is $1/10^{th}$ of the potential for that field tile. In-fact, the bioreactor will be able to treat 100% of the flow at 0.1 cfs, meaning that the bioreactor will more than likely remove remove nitrogen and a more cost effective rate than the provided estimate.